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Assistant Commissioner for Patents
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Sir:

Transmitted herewith for filing is the patent application of

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SEO, Kang S.

For: METHOD FOR RECORDING DIGITAL DATA STREAM AND FOR PROVIDING PRESENTATION MANAGING INFORMATION FOR THE RECORDED DIGITAL DATA STREAM

Enclosed are:

X A specification consisting of 18 pages

X 7 sheet(s) of formal drawings

___ An assignment of the invention

X Certified copy of Priority Document(s)

X Executed Declaration ___ Original X Photocopy

___ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27

___ Preliminary Amendment

___ Information Disclosure Statement, PTO-1449 and reference(s)

___ Other ____

The filing fee has been calculated as shown below:

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BASIC FEE	***********	**********	*****	$690.00	or	****	$345.00
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MULTIPLE DEPENDENT CLAIM PRESENTED no			+260 = $	0.00	or	+130 = $	0.00
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Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

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METHOD FOR RECORDING DIGITAL DATA STREAM AND FOR PROVIDING PRESENTATION MANAGING INFORMATION FOR THE RECORDED DIGITAL DATA STREAM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method for providing presentation managing information which is required for a digital television to present received program variously and immediately when reproducing digital data stream recorded in a disk recording medium such as a high density digital versatile disk (referred as 'HDVD' hereinafter).

2. Description of the Related Art

FIG. 1 is block diagrams of a DVD player and a digital television which are connected each other through a digital interface such as IEEE 1394 standard.

The DVD player 100 comprises an optical pickup 2 for detecting data recorded in a DVD 1; a demodulator 3 for demodulating and error-correcting the detected data; a scrambler 4 (or a copy protecting device) for scrambling

data outputted from the demodulator 3 with copy protecting codes; a path selector 5 for selecting one or two output path for data scrambled with the copy protecting codes; a data parser 6 for parsing data stream, whose type is program stream (PS), received through the path selector 5 into presentation and navigation data and then parsing the presentation data into audio, video and sub-picture data again; decoders 7 and 8 for decoding the parsed audio and video data into uncompressed data respectively; a presentation engine 9 for combining the decoded audio and video data into digital audio signal and video signal; D/A converters 10 and 11 for converting the digital audio and video data into corresponding analog signals respectively; a microcomputer 12 for controlling reproduction operation for the optical disk 1 depending upon the navigation data from the data parser 6 and a key command from a user; a memory 15 storing data necessary for control operation of the microcomputer 12; a PS/TS converter 13 for converting the PS outputted from the path selector 5 into transport stream (TS); and an interface 14 for transmitting the converted TS through a IEEE 1394 digital communication line.

The digital TV 200 comprises an interface 21 for receiving TS from the DVD player 100 through the IEEE 1394 digital communication line; a deMUX 23 for demuxing the received TS into audio and video data; decoders 24 and 25 for decoding the audio and video data into uncompressed audio and video data respectively; D/A converters 26 and 27 for converting the uncompressed digital data into corresponding analog audio and video signals respectively; a microcomputer 22 for generating control signals for each element corresponding to a users key input; an on-screen displaying (OSD) circuitry 28 for outputting character signals corresponding to an advisory message provided by

the microcomputer 22 onto a screen; a mixer 30 for mixing the character signals with the video signals; and a memory 29 storing data necessary for control operation of the microcomputer 22.

A key entering means 50 such as a remote controller for controlling operation of the DVD player 100 and/or the D-TV 200 is also shown in FIG. 1.

In the DVD player 100 configured as FIG. 1, recorded signals detected from the DVD 1 by the optical pickup 2 are demodulated into PS by the demodulator 3. The PS is separated into audio, video and sub-picture data of MPEG format by the data parser 6, and the MPEG-formatted data are converted into audio and video signals by the decoders 7, 8, and 9, the presentation engine 10, and the D/A converters 11 and 12. Also, the PS is sent to the PS/TS converter 14 through the path selector 5. The PS/TS converter 14 decodes the PS and interprets the stream identification number, sorts out the PS into program specific information (PSI) for controlling program presentation, presentation data containing audio and video data, and system clock data.

The PSI and system clock data are used as information for controlling presentation of program and system clock synchronization, respectively.

The presentation data are converted into TS whose format is acceptable to the digital TV 200 and transferred to the digital TV 200 through the IEEE 1394 interfaces 14 and 21. Accordingly, the digital TV 200 can present high-quality digital video and audio to a viewer after decoding the received TS.

The difference between aforementioned PS and TS is as follows.

The PS consists of several packs and each pack

consists of packetized elementary stream (PES) packets containing digitized video, audio, and additional information data. A PES packet can contain data whose size is variable so that the size of a PES packet may not be same all the time.

On the contrary, the TS consists of transport packets (TPs) and each packet has a fixed length of 188 bytes including its packet header.

Accordingly, when converting PS into TS, each PES packet of PS should be divided into packets of TS sequentially and necessary header information is added to each divided transport packet (TP) at that time. Because a PES packet is divided into multiple TPs, remaining area of the last TP is stuffed with null data after writing all data of a PES packet in the multiple TPs.

However, A recently-developed HDVD player has adopted the TS format as the recording-type of data stream for a HDVD so that data stream reproduced from a HDVD can be directly signal-processed in a digital television in consideration that a HDVD player is connected with a digital television. Therefore no TS/PS conversion will be required in transmitting reproduced digital data stream to a digital television. However, a digital television receiving the transport stream needs presentation managing information such as program specific information (PSI) for various and stable video and audio presentation. It is standard that the PSI is periodically or intermittently inserted in the digital broadcast signal.

Accordingly, the method for recording presentation managing information such as the PSI repeatedly in a HDVD may be considered. However, if the presentation managing information is repeatedly recorded in a HDVD, the space for program data is remarkably decreased.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method for constructing presentation managing information such as PSI a digital television requires based on the management information of digital data stream reproduced a high-density disk-type recording medium such as HDVD, inserting the constructed presentation managing information in packetized format into the reproduced data stream intermittently or periodically, and then transmitting the data stream containing packetized presentation managing information to a digital television, thereby eliminating the necessity of repeated recording of the presentation managing information such as the program specific information.

A method for recording digital data stream in a disk recording medium according to the present invention, divides digital data stream into predetermined-sized packets in the basis of presentation time of each divided stream; produces specific information indicating when to send presentation managing information to be used for control the presentation of the digital data stream; inserts the produced specific information between the packets for the divided stream; and records the packets and the specific information sequentially in the disk recording medium.

A method for providing presentation managing information of digital data stream according to the present invention, reproduces data stream recorded in a disk recording medium; extracts navigation information from the reproduced data stream; produces a program managing information packet based on the extracted navigation information; decides when to send the produced program managing information packet; and transmits the presentation

managing information packet at the decided time.

Another method for providing presentation managing information of digital data stream according to the present invention, after aforementioned data stream reproducing, navigation information extracting, and program managing information packet producing, reconstructs the video and audio data packets of the reproduced data stream whiling inserting the produced program managing information packet into the data packets, and transmits the reconstructed packets sequentially.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention, illustrate the preferred embodiments of the invention, and together with the description, serve to explain the principles of the present invention.

In the drawings:

FIG. 1 is a block diagram of a general DVD player and a digital television;

FIG. 2 is a block diagram of a DVD player and a digital television which a method for recording digital data stream and providing presentation managing information therefor according to the present invention is applied to;

FIG. 3 shows layer structure and data syntax of the presentation control information (PCI) according to the present invention;

FIG. 4 is the first embodiment of a presentation managing information providing method according to the present invention;

FIG. 5 is the second embodiment of a presentation managing information providing method according to the present invention;

FIG. 6 is the third embodiment of a presentation managing information providing method according to the present invention; and

FIG. 7 is the fourth embodiment of a presentation managing information providing method according to the present invention;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In order that the invention may be fully understood, preferred embodiments thereof will now be described with reference to the accompanying drawings.

FIG. 2 is a block diagram of a HDVD player and a digital television to which a method for recording digital data stream and providing presentation managing information therefor according to the present invention is applied.

The HDVD player 300 of FIG. 2 comprises an optical pickup 32 for detecting data recorded in a HDVD 31; a demodulator 33 for demodulating and error-correcting the detected data; a scrambler 34 (or a copy protecting device) for scrambling data outputted from the demodulator 33 with copy protecting codes; a data parser 35 for parsing data stream, whose type is TS, scrambled with the copy protecting codes into presentation and navigation data and then parsing the presentation data into audio and video data; a presentation engine 36 for decoding the parsed audio and video data into uncompressed data respectively, and converting the decoded audio and video data into digitized real audio and video data; D/A converter 37 for converting the digitized audio and video data into corresponding analog signals respectively; a microcomputer 39 for generating packetized presentation managing information, for example PSI to be used for adequate and immediate program presentation, and controlling

reproduction operation for the HDVD 31 based on the navigation data from the data parser 35 and a key command from a user; a memory 40 storing data necessary for control operation of the microcomputer 39; a TS MUX 38 for reformatting the video and audio data from the parser 35 into TS packets and multiplexing the reformatted packets and the packetized program managing information from the microcomputer 39; and an interface 15 for transmitting the multiplexed transport packets through a IEEE 1394 digital communication line.

The digital TV 200 of FIG. 2 comprises an interface 21 for receiving TS from the DVD player 100 through the IEEE 1394 digital communication line; a deMUX 23 for demuxing the received TS into audio and video data; decoders 24 and 25 for decoding the audio and video data into uncompressed audio and video data respectively; D/A converters 26 and 27 for converting the uncompressed digital data into corresponding analog audio and video signals respectively; a microcomputer 22 for generating control signals for each element corresponding to a users key input; an on-screen displaying (OSD) circuitry 28 for outputting character signals corresponding to an advisory message provided by the microcomputer 22 onto a screen; a mixer 30 for mixing the character signals with the video signals; and a memory 29 storing data necessary for control operation of the microcomputer 22.

The method for recording digital data stream and providing presentation managing information for digital data stream according to the present invention will now be described in detail.

FIG. 3 is recording syntax for TS-formatted data of a HDVD. As shown in FIG. 3, one or more high-density-recorded stream objects (HOB) are recorded in a HDVD. A single HOB

is corresponding to a single title or program and is composed of a lot of high-density-recorded stream object units (HOBUs). A single HOBU is composed of the first pack of navigation data and the remaining packs, which are corresponding to the GOP layer of the MPEG standard, of video and audio data. The navigation pack contains program control information (PCI) and data search information (DSI) and the first pack among presentation data packs is always start pack of data of a Infra-coded picture (I-picture).

In the PCI recorded in the first pack, PCI general information and information on angle, highlight, recording parameters, whose format is given in (a) of FIG. 3, are recorded for controlling various presentation of data stream reproduced from a HDVD. Therefore, the microcomputer 39 extracts the PCI, that is, the PCI general information and information of angle, highlight and recording parameters and constructs the extracted information into TP-formatted PSI which is interpretable in the digital television 200. The constructed PSI packet consists of internal fields described in (b) of FIG. 3.

Other attribute fields not described in (b) of FIG.3 may be inserted in the PSI packet or may replace the described fields of the PSI packet depending upon the data stream to be transmitted to the digital television.

FIG. 4 is the first embodiment of a presentation managing information providing method according to the present invention. When a TS for audio and video data of a title or a program is recorded by a TS MUX 500 equipped in the HDVD manufacturing apparatus as shown in FIG. 4 to manufacture a HDVD-ROM, there may be time interval in which audio and video data packets will not be delivered to a presentation apparatus such a digital television. Therefore, the microcomputer 39 of the HDVD player 300 detects the

interval while reproducing recorded program or title of a HDVD 31, then outputs the PSI packet produced by aforementioned method to the TS MUX 38 during the detected interval after deciding on whether the PSI packet should be delivered at this interval, thereby inserting the packetized presentation managing information such as the PSI between the transport packets containing video and audio data without delaying any data packet in transferring to the digital television 200.

To be brief, the microcomputer 39 decides whether to send the PSI packet at the time when the null interval is detected, produces the PSI packet and inserts it into the null interval based on the decision, therefore, the digital television 200 receives intermittently PSI for the reproduced data stream so that it uses PSI to present video and audio in various format and/or as immediately as possible when channel is switched.

FIG. 5 is the second embodiment of a presentation managing information providing method according to the present invention. When a TS for audio and video of a title or a program is recorded by a TS MUX 500 equipped in the HDVD manufacturing apparatus as shown in FIG. 5 to manufacture a HDVD-ROM, if there is time interval in which audio and video data packets will not be delivered to a presentation apparatus and the time interval is likely to be used as a time slot for a PSI packet to be sent, a null data packet, whose packet ID, for example 1FFFh is different from those of video and audio packets, is inserted for the time interval to be recorded between data packets. Therefore, the microcomputer 39 of the HDVD player 300 detects the null data packet while reproducing recorded program or title, then replaces the detected null packet with the PSI packet produced by aforementioned method and

applies the PSI packet to the TS MUX 38 instead of the detected null data packet, thereby providing the packetized presentation managing information such as the PSI between the TS packets containing video and audio without affecting the data packet delivering time.

To be brief, the microcomputer 39 produces the PSI packet and replaces the null data packet with it whenever the null data packet is detected or several null data packets are detected successively, therefore, the digital television 200 receives intermittently PSI for the reproduced data stream so that it uses PSI to control presentation of video and audio.

FIG. 6 is the third embodiment of a presentation managing information providing method according to the present invention. When a TS for audio and video of a title or a program is recorded by a TS MUX 500 equipped in the HDVD manufacturing apparatus as shown in FIG. 6 to manufacture a HDVD-ROM, if there is time interval in which audio and video data packets will not be delivered to a presentation apparatus and the time interval should be used as a time slot for a PSI packet to be sent, a pseudo PSI packet, whose packet ID is distinguished from those of video and audio packets, is inserted for the time interval to be recorded between data packets. This pseudo PSI packet has no data field besides information regarding time to send real PSI packet.

Therefore, the microcomputer 39 of the HDVD player 300 detects the pseudo PSI packet while reproducing recorded program or title, then replaces the detected pseudo packet with a real PSI packet produced by aforementioned method and applies the PSI packet to the TS MUX 38 on time specified in the time information written in the detected pseudo PSI packet, thereby providing the

packetized presentation managing information such as the PSI between the TS packets containing video and audio without affecting the data packet delivering time.

To be brief, the microcomputer 39 produces the PSI packet and replaces pseudo PSI packet with it whenever the pseudo PSI packet is detected, therefore, the digital television 200 receives intermittently PSI for the reproduced data stream so that it uses PSI to present video and audio variously and/or immediately.

FIG. 7 is the fourth embodiment of a presentation managing information providing method according to the present invention. For this embodiment, the TS MUX 38 of the HDVD player 300 shown in FIG. 2 is replaced with two elements of a TS decoder 381 and a TS encoder 382. The TS decoder 381 converts the reproduced audio and video data packets from the data parser 35 into packetized elementary stream (PES) and the TS encoder 382 reconstructs the PES into transport packets as inserting the PSI packets between the audio and video data packets. In this embodiment, when a TS for audio and video of a title or a program is recorded by a TS MUX 500 equipped in the HDVD manufacturing apparatus as shown in FIG. 7 to manufacture a HDVD-ROM, no information indicating when to deliver the PSI packet is written. Therefore, the TS encoder 382 encodes the PSI packets produced periodically by the microcomputer 39 into transport packets together with the PES of audio and video data being inputted from the TS decoder 381, thereby inserting the packetized PSI between the audio and video data transport packets periodically.

Because the TS encoder 382 reconstructs the decoded PES into transport packets, the reconstructed packets may not be transmitted to the digital television 200 on time specified in the time information such as PTS or PCR

contained in the original TS packets recorded in the HDVD. Therefore, the TS encoder 382 writes new time information adequate to present delivering time in the reconstructed packets.

Accordingly, the PSI for the data stream reproduced from the HDVD is periodically provided to the digital television 200, which means that the digital television 200 receives periodically PSI for the received data stream so that it uses PSI to present video and audio data variously and/or immediately.

The method for providing PSI of the reproduced digital data stream according to the present invention makes it unnecessary to record PSI repeatedly in the presentation data packs by producing PSI packets based on the information written in the navigation pack, thereby improving the recording efficiency of the high-density disk recording medium.

Although the preferred embodiment of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as recited in the accompanying claims.

What is claimed is:

1. A method for recording digital data stream in a disk recording medium, comprising the steps of:

(a) dividing digital data stream into predetermined-sized packets in the basis of presentation time of each divided stream;

(b) producing specific information indicating when to send presentation managing information to be used for control the presentation of the digital data stream; and

(c) inserting the produced specific information between the packets for the divided stream and recording the packets and the specific information sequentially in the disk recording medium.

2. A method set forth in claim 1, wherein said step (c) inserts, if there is time interval in which audio and video data packets will not be delivered to a presentation apparatus, the specific information for the time interval.

3. A method set forth in claim 2, wherein said step (c) inserts the specific information for the time interval in which the program specific information is likely to be delivered to the presentation apparatus.

4. A method set forth in claim 2, wherein said step (c) inserts the specific information for the time interval in which the program specific information should be delivered to the presentation apparatus.

5. A method set forth in claim 4, wherein the specific information is a transport packet containing information regarding the time to deliver the program specific information.

6. A method for providing presentation managing information of digital data stream, comprising the steps of:

(a) reproducing data stream recorded in a disk recording medium;

(b) extracting navigation information from the reproduced data stream;

(c) producing a program managing information packet based on the extracted navigation information; and

(d) deciding when to send the produced program managing information packet and transmitting the presentation managing information packet at the decided time.

7. A method set forth in claim 6, wherein said step (d) detects a time interval in which audio and video data packets of the reproduced data stream are not being delivered to a presentation apparatus, and transmits the produced presentation managing information at the detected time interval.

8. A method set forth in claim 6, wherein said step (d) detects specific information indicating that the presentation managing information can be delivered to a presentation apparatus, and transmits the presentation managing information at the time interval in which the specific information is detected.

9. A method set forth in claim 8, wherein the specific information is a transport packet, whose packet ID is distinguished from those of video and audio data packets, containing null data.

10. A method set forth in claim 6, wherein said step (d) detects specific information containing time information indicating when the presentation managing information should be delivered to a presentation apparatus, and transmits the presentation managing information on time indicated in the time information.

11. A method for providing presentation managing information of digital data stream, comprising the steps of :

(a) reproducing data stream recorded in a disk recording medium wherein the data stream contains video and audio data transport packets;

(b) extracting navigation information from the reproduced data stream;

(c) producing a program managing information packet based on the extracted navigation information;

(d) reconstructing the reproduced video and audio

data packets while inserting the produced program managing information packet into the data packets; and

(e) transmitting the reconstructed packets sequentially.

12. A method set forth in claim 11, wherein said step (d) comprises the steps of:

(d1) converting the reproduced data stream into packetized elementary stream; and

(d2) inserting the produced presentation managing information while reconstructing the converted packetized elementary stream into transport packets

13. A method set forth in claim 12, wherein said step (d2) writes new transport time information, which is different from original time information written in the reproduced data packets, in each reconstructed transport packet.

14. A method set forth in claim 11, wherein said step (d) inserts the program managing information periodically into the data packets.

15. A recording device, comprising the recorded data of:

digital data stream consisting of predetermined-sized packets divided in the basis of presentation time of each packet; and

specific information indicating when to send presentation managing information to be used for control the presentation of the packets, wherein the specific information has been inserted intermittently into the digital data stream.

16. A device set forth in claim 15, wherein the specific information has been inserted for a time interval in which audio and video data packets will not be delivered to a presentation apparatus.

17. A device set forth in claim 16, wherein the specific information has been inserted for the time interval in which the program specific information is likely to be delivered to the presentation apparatus.

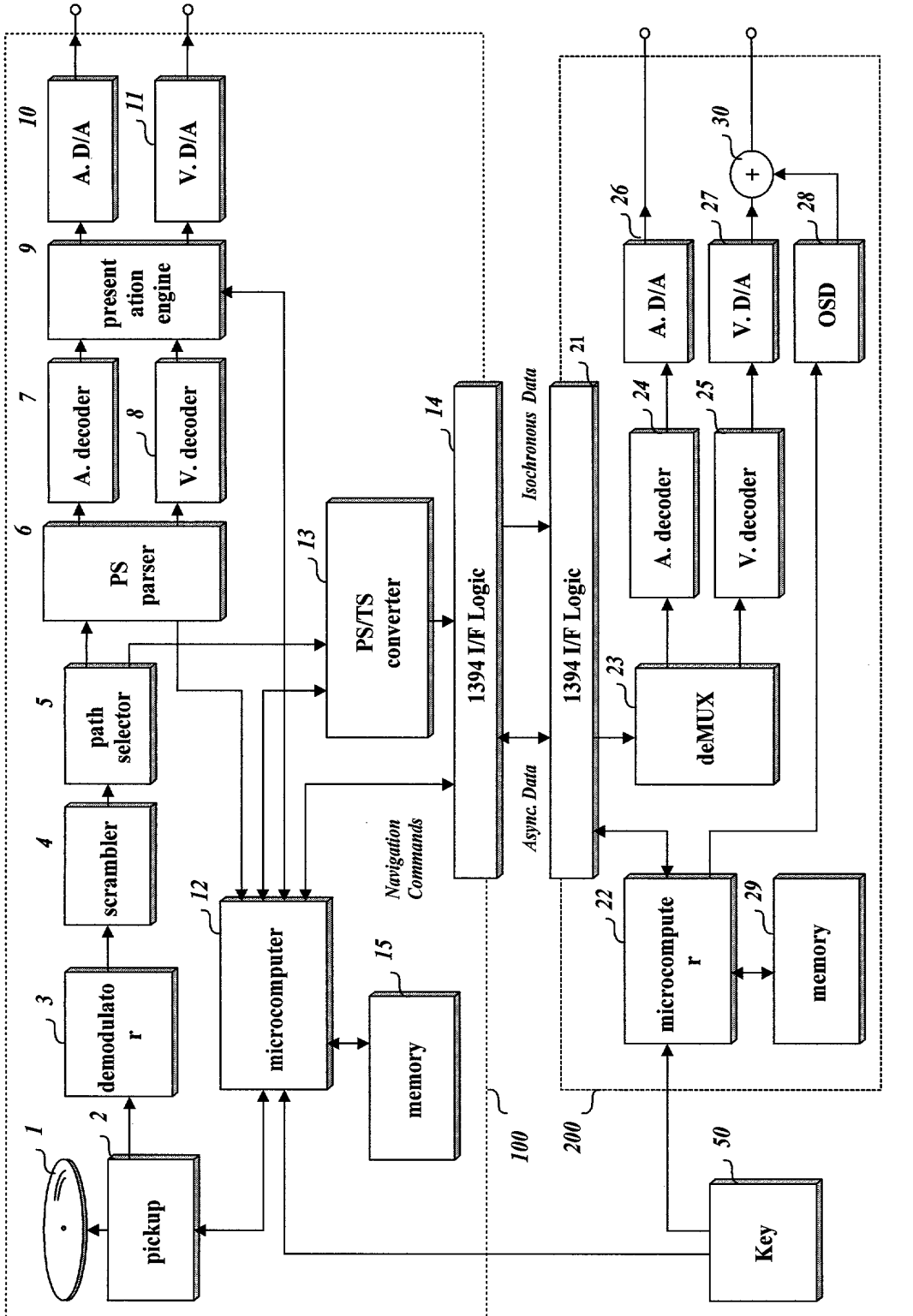
18. A device set forth in claim 16, wherein the specific information has been inserted for the time interval in which the program specific information should be delivered to the presentation apparatus.

19. A device set forth in claim 18, wherein the specific information is a transport packet containing information regarding the time to deliver the program specific information.

ABSTRACT OF DISCLOSURE

The present invention relates to a method for providing presentation managing information which is required for a digital television to present received program immediately and adequately when reproducing digital data stream recorded in a disk recording medium such as a high density digital versatile disk. A method according to the present invention, when recording data stream, divides digital data stream into predetermined-sized packets in the basis of presentation time of each divided stream; produces specific information indicating when to send presentation managing information to be used for control the presentation of the digital data stream; inserts the produced specific information between the packets for the divided stream; and records the packets and the specific information sequentially in the disk recording medium, and when reproducing data stream, reproduces data stream recorded in a disk recording medium; extracts navigation information from the reproduced data stream; produces a program managing information packet based on the extracted navigation information; decides when to send the produced program managing information packet; and transmits the presentation managing information packet at the decided time. Therefore, the present invention makes it unnecessary to record program specific information (PSI) repeatedly in the presentation data packs by producing PSI packets based on the information written in the navigation pack, thereby improving the recording efficiency of the high-density disk recording medium.

FIG. 1



Conventional Art

FIG. 2

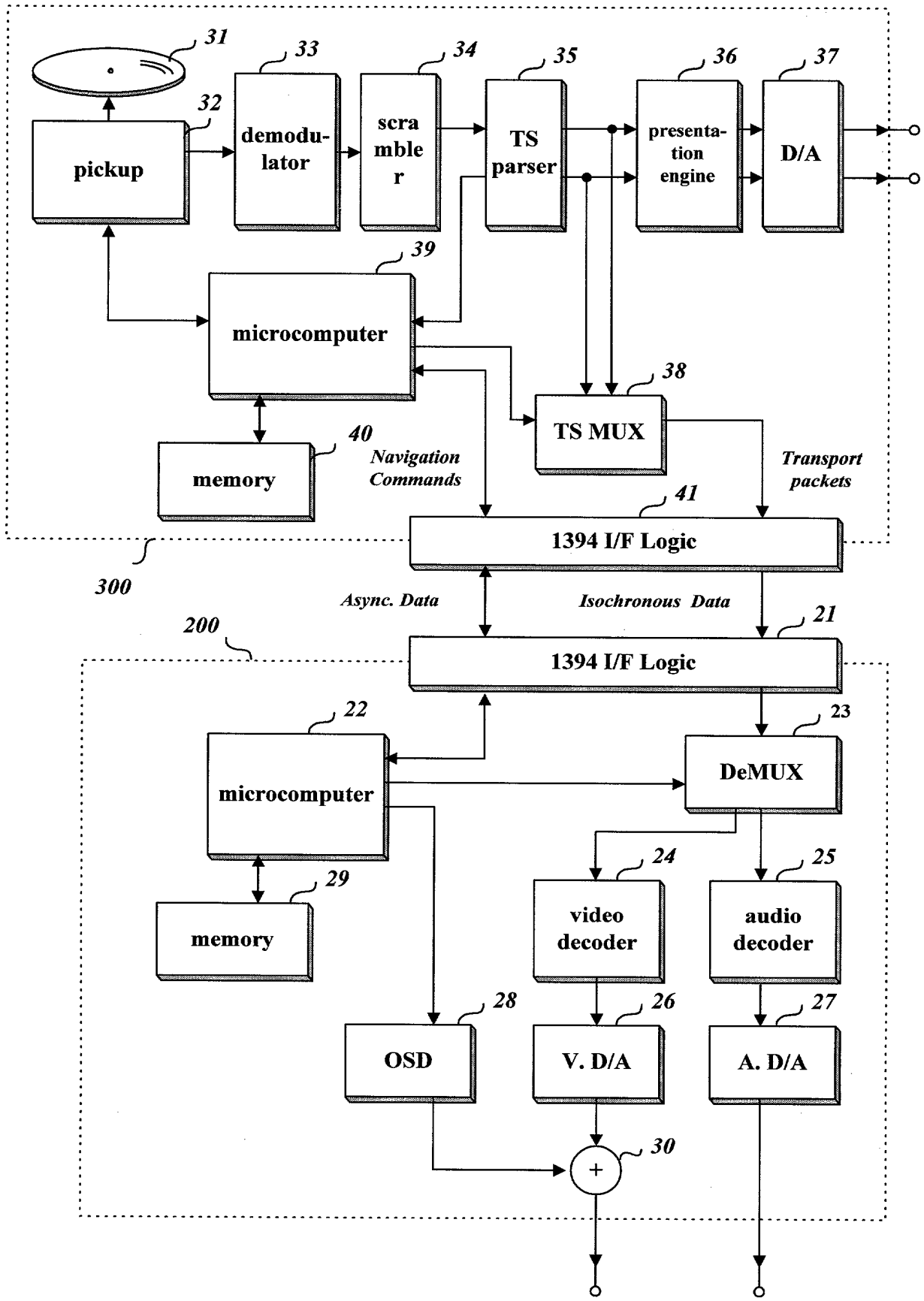
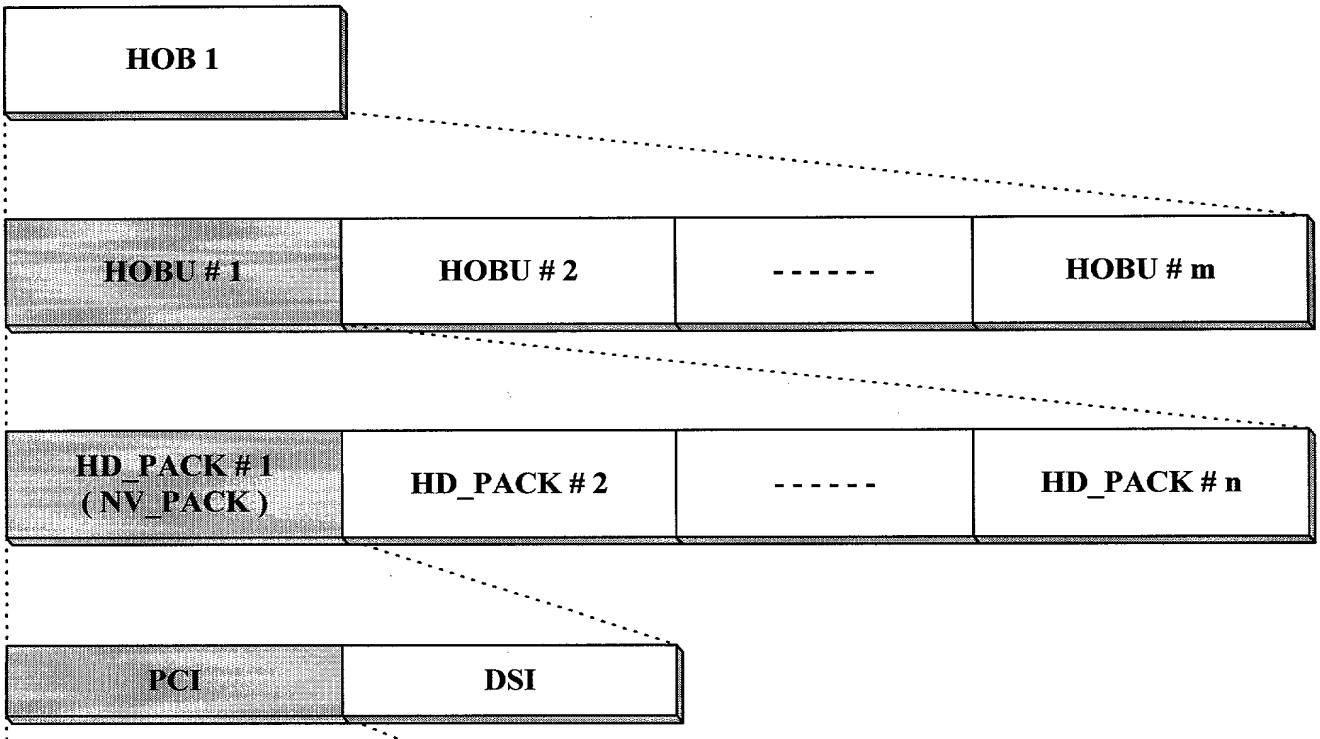

31
33
34
35
36
37
32
pickup
demodu-
lator
scra
mble
r
TS
parser
presenta-
tion
engine
D/A
39
microcomputer
38
TS MUX
40
memory
Navigation
Commands
Transport
packets
41
1394 I/F Logic
300
Async. Data
Isochronous Data
200
21
1394 I/F Logic
22
23
microcomputer
DeMUX
24
25
29
memory
video
decoder
audio
decoder
28
26
27
OSD
V. D/A
A. D/A
30
+

FIG. 3



Field	Content	Bytes
PCI_GI	PCI General Information	60
NSML_AGLI	Angle Inform. for non-seamless	36
HLI	Highlight Information	694
RECI	Recording Information	189

(a)

PSI Transport Packet

Field	Content	Bytes
PSI_GI	PSI General Information	60
SEL_AGLI	Selected Angle Information	4
SEL_HLI	Selected Highlight Information	48
SEL_RECI	Seclected Recording Information	31
RSV	Reserved	-

(b)

FIG. 4

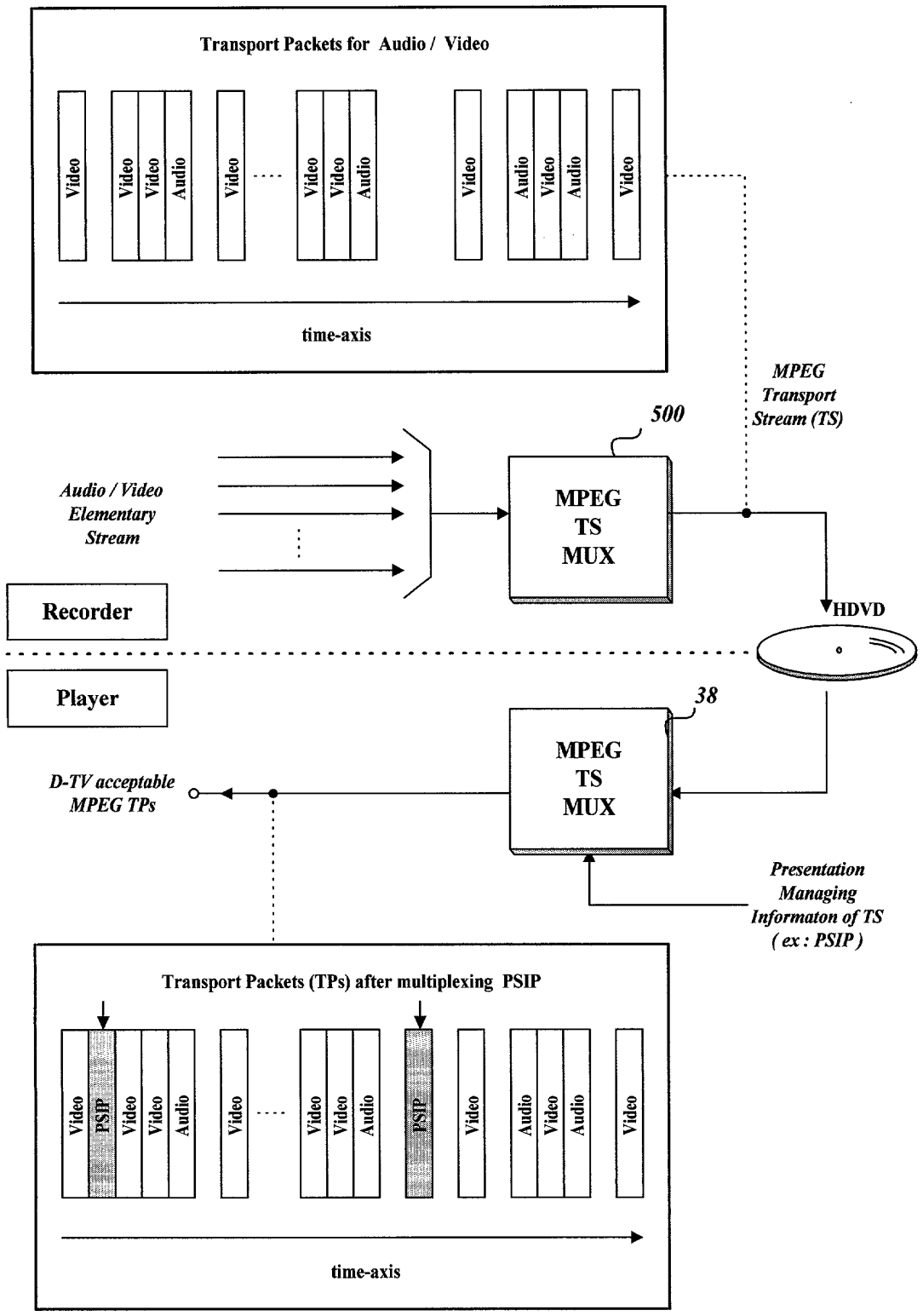

Transport Packets for Audio / Video
Video
Video Video Audio
Video
Video Video Audio
Video
Audio Video Audio
Video
time-axis
MPEG Transport Stream (TS)
500
Audio / Video Elementary Stream
MPEG TS MUX
Recorder
HDVD
Player
38
MPEG TS MUX
D-TV acceptable MPEG TPs
Presentation Managing Informaton of TS (ex : PSIP)
Transport Packets (TPs) after multiplexing PSIP
Video
PSIP
Video Video Audio
Video
Video Video Audio
PSIP
Video
Audio Video Audio
Video
time-axis

FIG. 5

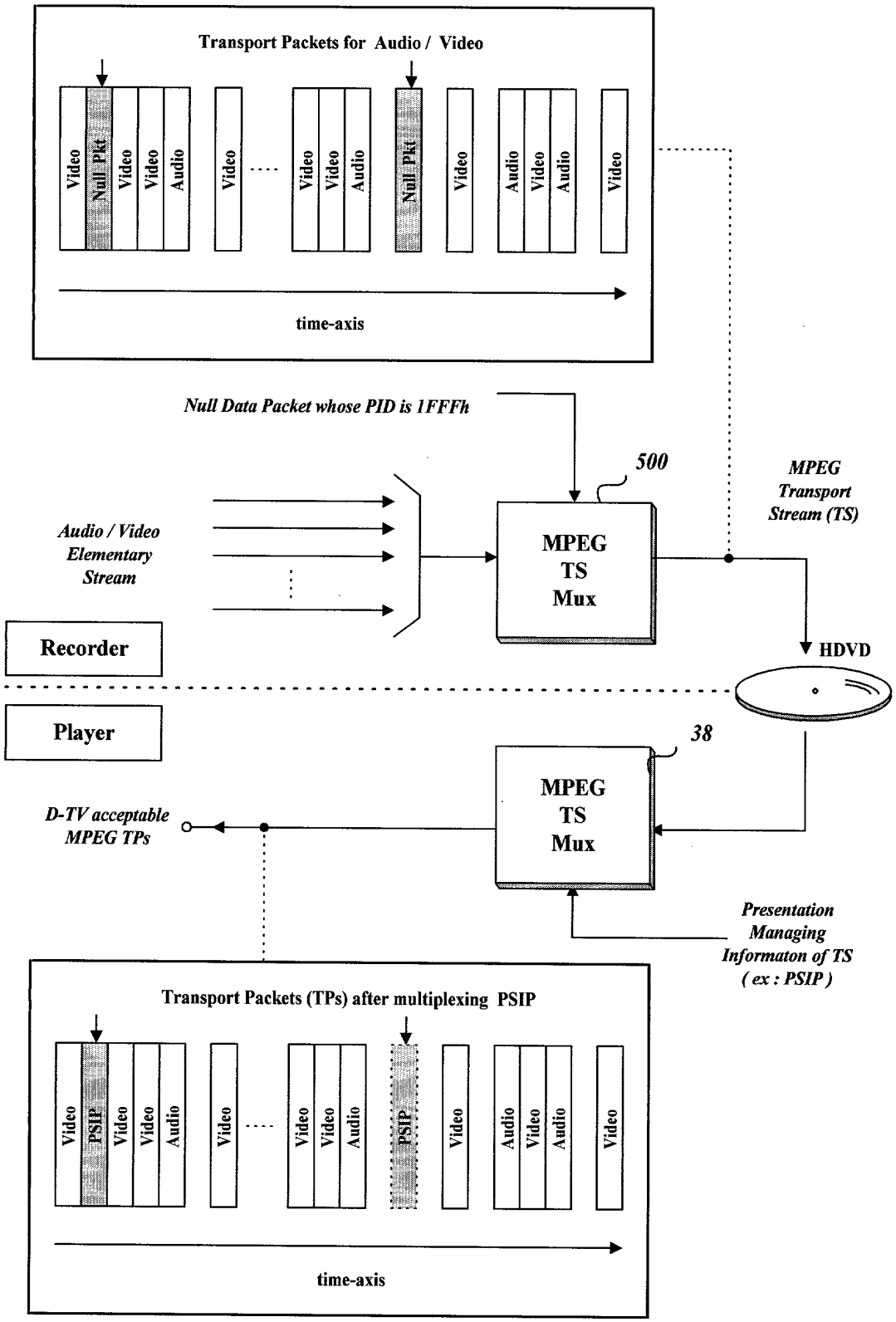

Transport Packets for Audio / Video
Video
Null Pkt
Video
Video
Audio
Video
Video
Video
Audio
Null Pkt
Video
Audio
Video
Audio
Video
time-axis
Null Data Packet whose PID is 1FFFh
500
MPEG
Transport
Stream (TS)
Audio / Video
Elementary
Stream
MPEG
TS
Mux
Recorder
HDVD
Player
38
MPEG
TS
Mux
D-TV acceptable
MPEG TPs
Presentation
Managing
Informaton of TS
(ex : PSIP)
Transport Packets (TPs) after multiplexing PSIP
Video
PSIP
Video
Video
Audio
Video
Video
Audio
PSIP
Video
Audio
Video
Audio
Video
time-axis

FIG. 6

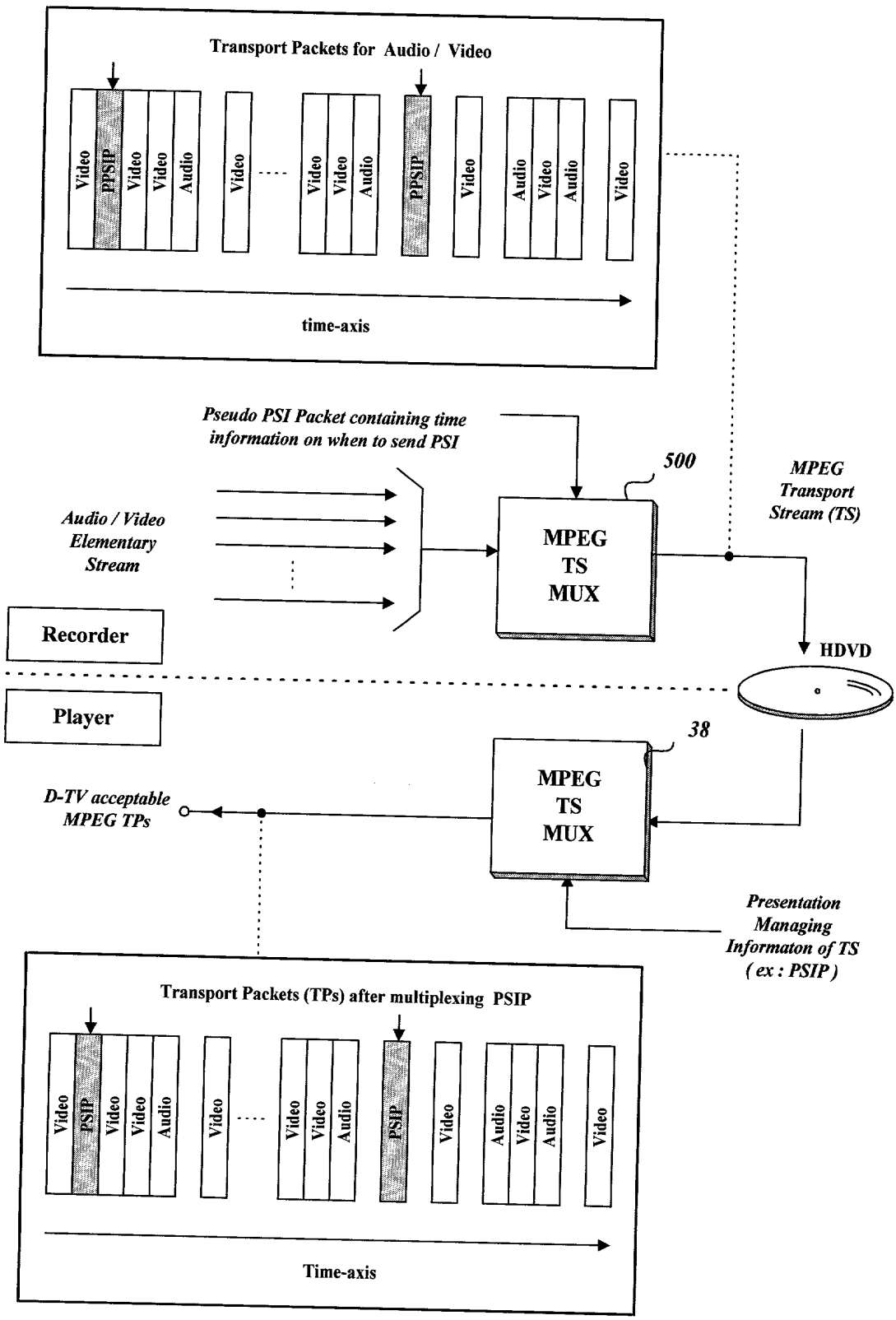
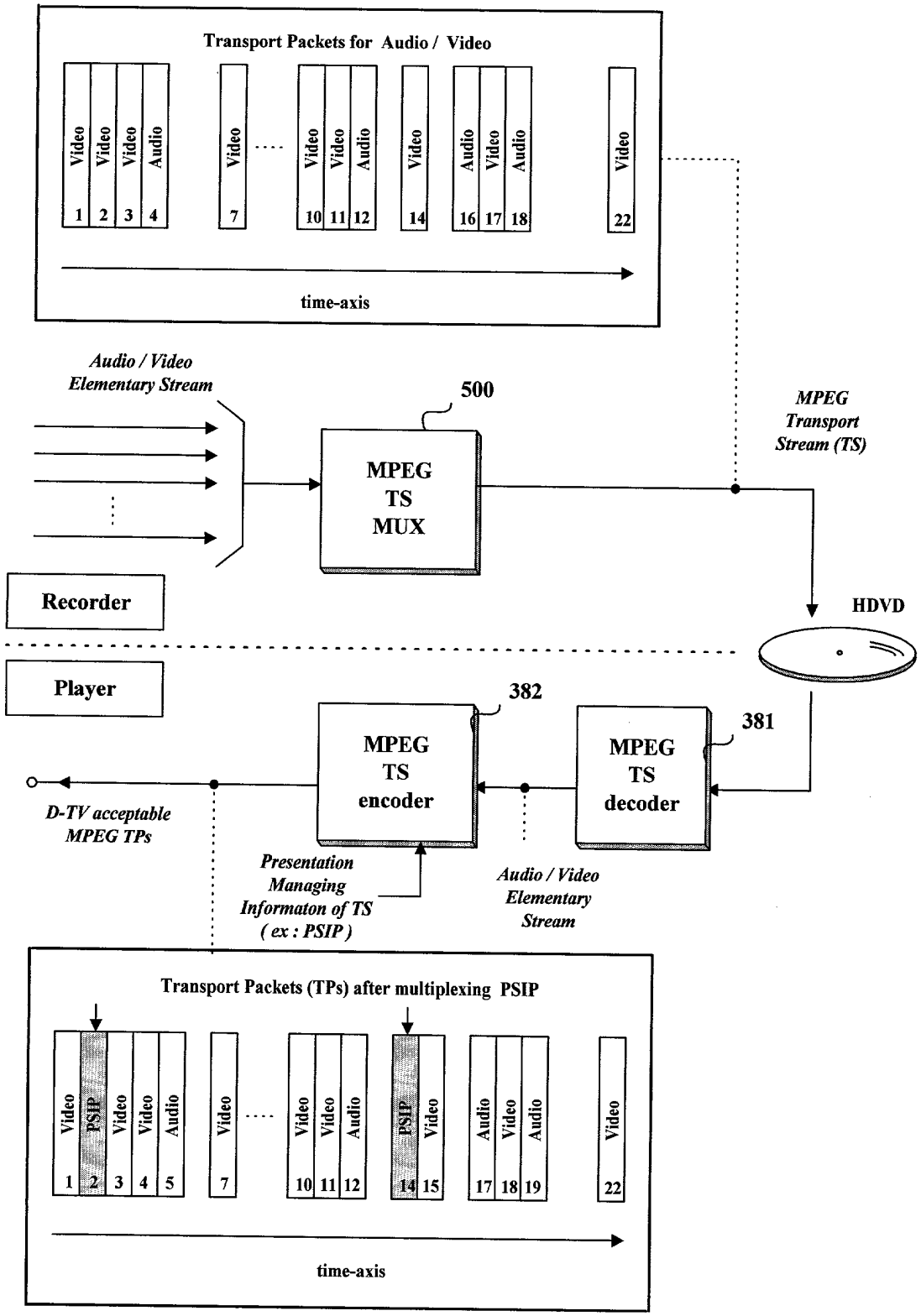

Transport Packets for Audio / Video
Video
PPSIP
Video
Video
Audio
Video
Video
Video
Audio
PPSIP
Video
Audio
Video
Audio
Video
time-axis
Pseudo PSI Packet containing time information on when to send PSI
500
MPEG Transport Stream (TS)
Audio / Video Elementary Stream
MPEG TS MUX
Recorder
HDVD
Player
38
MPEG TS MUX
D-TV acceptable MPEG TPs
Presentation Managing Informaton of TS (ex : PSIP)
Transport Packets (TPs) after multiplexing PSIP
Video
PSIP
Video
Video
Audio
Video
Video
Video
Audio
PSIP
Video
Audio
Video
Audio
Video
Time-axis

FIG. 7


Transport Packets for Audio / Video
Video 1
Video 2
Video 3
Audio 4
Video 7
Video 10
Video 11
Audio 12
Video 14
Audio 16
Video 17
Audio 18
Video 22
time-axis
Audio / Video Elementary Stream
500
MPEG TS MUX
MPEG Transport Stream (TS)
Recorder
HDVD
Player
382
MPEG TS encoder
381
MPEG TS decoder
D-TV acceptable MPEG TPs
Presentation Managing Informaton of TS (ex : PSIP)
Audio / Video Elementary Stream
Transport Packets (TPs) after multiplexing PSIP
Video 1
PSIP 2
Video 3
Video 4
Audio 5
Video 7
Video 10
Video 11
Audio 12
PSIP 14
Video 15
Audio 17
Video 18
Audio 19
Video 22
time-axis

Attorney Docket No.
2950-0166P

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PLEASE NOTE:
YOU MUST
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COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT AND DESIGN APPLICATIONS

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated next to my name; that I verily believe that I am the original, first and sole inventor (if only one inventor is named below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Insert Title: METHOD FOR RECORDING DIGITAL DATA STREAM AND FOR PROVIDING PRESENTATION MANAGING INFORMATION FOR THE RECORDED DIGITAL DATA STREAM

Fill In Appropriate Information For Use Without Specification Attached:

the specification of which is attached hereto. If not attached hereto,
the specification was filed on _____ as
United States Application Number _____;
and amended on _____ (if applicable) and/or
the specification was filed on _____ as PCT
International Application Number _____; and was
amended under PCT Article 19 on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months (six months for designs) prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Insert Priority Information: (if appropriate)

Prior Foreign Application(s)			Priority Claimed	
99-33202 (Number)	Korea (Country)	08/12/1999 (Month/Day/Year Filed)	☑ Yes	☐ No
(Number)	(Country)	(Month/Day/Year Filed)	☐ Yes	☐ No
(Number)	(Country)	(Month/Day/Year Filed)	☐ Yes	☐ No
(Number)	(Country)	(Month/Day/Year Filed)	☐ Yes	☐ No

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional applications(s) listed below.

Insert Provisional Application(s), (if any)

(Application Number) (Filing Date)

(Application Number) (Filing Date)

All Foreign Applications, if any, for any Patent or Inventor's Certificate Filed More than 12 Months (6 Months for Designs) Prior to the Filing Date of This Application:

Insert Requested Information: (if appropriate)

Country	Application Number	Date of Filing (Month/Day/Year)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States and/or PCT application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States and/or PCT application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to the patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

Insert Prior U.S Application(s), (if any)

(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)
(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)

Attorney Docket No.
2950-0166P

I hereby appoint the following attorneys to prosecute this application and/or an international application based on this application and to transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent based on instructions received from the entity who first sent the application papers to the attorneys identified below, unless the inventor(s) or assignee provides said attorneys with a written notice to the contrary:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of First or Sole Inventor. Insert Name of Inventor. Insert Date This Document is Signed. Insert Residence. Insert Citizenship. Insert Post Office Address.

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POST OFFICE ADDRESS (Complete Street Address Including City, State & Country):		

*DATE OF SIGNATURE